

Remarks

Claims 1-13 and 31-37 are pending in the application. Claims 1-13 and 31-37 are rejected. No new matter has been added. It is respectfully submitted that the pending claims define allowable subject matter.

Claims 34-37 have been rejected under 35 USC § 112, second paragraph, as being indefinite. Applicants have amended claim 34 to more particularly point out and distinctly claim the subject matter that Applicants regard as the invention. In particular, "of the reflective layer" has been deleted and Applicants submit that the rejection has been overcome and should be withdrawn.

Claims 1, 3-6, 8-13, 31, 33, 34, 36 and 37 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Howden (U.S. Patent 4,484,798) in view of Pichel (U.S. Patent 3,428,533) or Jochim (U.S. Patent 3,378,469). Applicants respectfully traverse this rejection.

Howden describes a method of manufacturing a multiple mirror reflector for a land based telescope wherein a segment 1 of a first series of segments comprises an accurately profiled, ultra-thin specularly reflective layer of metal 6 bonded to a substrate 7 having a concave surface 8 by means of an adhesive 9. Additional similar segments are provided (column 7, lines 11-15). The method includes bonding a reflective layer to a concave surface of a substrate and mounting the substrate on a larger, dished rigid support, characterized in that at least one series of identical reflector segments are prepared. Each reflector segment of a series comprises a substrate and a reflective layer bonded thereto by an adhesive. A segment is formed by transfer replication of an ultra-thin accurately profiled layer of reflective metal from the surface of a master mould tool to the surface of the substrate. Each of a series of segments are assembled and individually mounted on a large, dished rigid support to form separate parts of a single profile of the reflector with a common focus for reflecting the radiation (column 3, line 57 to column 4 line 5).

In order to assist mould release and to avoid penetration of adhesive through the thin reflective metal layer on the master mould the specularly reflective metal layer may

comprise a first layer of a vapour deposited metal, such as aluminum, and a second layer of another harder inert metal such as, nickel, chromium, copper or an alloy thereof, which is deposited by metal vapour deposition, sputtering or by electro-chemical deposition on the first thin layer. The master mould tool is coated with a thin layer of metal appropriate to the subsequent infra-red, optical and/or short wave requirements. The metal which is deposited as the ultra-thin layer on the convex surface of the master mould tool may be aluminum, or gold although other reflective metal films such as, copper, tin or nickel may also be suitable for certain applications (column 5, lines 8-23).

Pichel describes a method for manufacturing a metal master for a parabolic mirror. In particular, a plastic sub-master having substantially the same shape and optical accuracy as a glass master is formed (column 3, lines 33-36). The plastic layer 13 is rigidized with a member 14 by means of epoxy or other adhesive 15 and glass master 10 removed (column 3, lines 42-54). A replica metal master from the plastic sub-master is then prepared by immersing the sub-master in an electroplating bath (column 3, lines 59-63). The optical surface of the sub-master is sensitized or rendered electrically conducting by coating it with a thin film or layer of metal, such as silver, which is deposited on the optical surface of the plastic sub-master (column 3, lines 64-75).

Next, employing necessary control to ensure uniform stress-free deposition, a layer of nickel 17 is electroplated over silver layer 16 (column 4, lines 6-11). Proper circulation and temperature maintenance of the electroplating solution, uniform rotation of the sub-master cathode, maintaining a uniform composition or strength of the electroplating solution, etc., are provided and which contribute to the deposition of a nickel layer of uniform thickness that is relatively stress free (column 4, lines 11-17). A backing or rigidizing structure 18 is mounted over the nickel layer, and with the rigidizing structure 18 firmly on nickel layer 17, the replica master structure separated from the plastic sub-master (column 4, lines 21-40). Then, the silver layer is chemically stripped from the nickel layer in such a manner that the optical surface of the replica master, which is the common surface between the silver and nickel layers, is not degraded (column 4, lines 45-49).

Jochim describes a similar method for fabricating an electroformed parabolic mirror using a parabolically-shaped glass master with the addition of removing the sub-

master from the bath to apply a mesh structure that will become a rigid backing structure to support the nickel layer (column 4, lines 13-18). Thus, following the removal of the sub-master, a mesh backing structure 18 is mounted over nickel layer 17 (column 4, lines 18-20).

Claim 1, as amended, recites a method of manufacturing a telescope mirror comprising “releasing the mirror body (25) with the reflective layer (26) from the mandrel (10), the mirror body (25) and reflective layer (26) forming a self-supported telescope mirror.”

Howden in combination with Pichel or Jochim fails to describe or suggest electroforming a mirror body onto a reflective layer by an electrochemical process with the mirror body and the reflective layer forming a self-supported telescope mirror. Although Howden discloses forming first and second layers to define a specularly reflective metal layer, Howden requires the extra deposition of an additional backing material (column 4, lines 6-14). Thereafter the substrate is bonded to the reflective layer prior to removing the reflective layer from the master mould. Thus, Howden requires a bonded substrate to provide support in contrast to the method recited in claim 1 wherein a self-supported telescope mirror is formed (e.g., mirror may be removed from the mandrel immediately after the electroforming of the mirror body) and released from a mandrel. Such a removal after electroforming is not possible using the method of Howden because the mirror is not self-supported and would be unstable.

Further, neither Pichel or Jochim describe or suggest the release of a self-supported mirror from a mandrel as recited in claim 1. In particular, the mirror formed by the method of Pichel requires an additional supporting structure prior to release from the master mould. Specifically, an additional rigidizing structure 18 is affixed to the mirror before the mirror can be released from the sub-master. The metal layer of Pichel simply does not provide a self-supported mirror. Additionally, the mirror formed by the method of Jochim requires an additional rigidizing structure, in particular, a mesh backing structure that must be affixed to the mirror before the mirror can be released from master mould. Again, in contrast to the method recited in claim 1, neither of these references describe or suggest a self-supported mirror formed by a mirror body and reflective layer that can be released from a mandrel.

Therefore, these references fail to describe or suggest a method of manufacturing a telescope mirror as recited in claim 1. Accordingly, for at least the reasons set forth above, Applicants submit that claim 1 is patentable over Howden in combination with Pichel or Jochim.

Claims 3-6 and 8-13 depend from independent claim 1. When the recitations of these claims are considered in combination with the recitations of claim 1, Applicants submit that these claims are likewise patentable over Howden in combination with Pichel or Jochim for at least the same reasons set forth above.

Claim 31, as amended, recites a method of manufacturing a telescoping mirror comprising “releasing the mirror body (25) with the reflective layer (26) from the mandrel (10) without a supporting structure.” As discussed in more detail above, and in combination with the other recitations of claim 31, Howden in combination with Pichel or Jochim fails to describe or suggest a method as recited in claims 31 including releasing a mirror body with a reflective layer from a mandrel without a supporting structure. The references cited all require an additional support or rigidizing structure before being released from a mandrel. Accordingly, for at least the reasons set forth above, Applicants submit that claim 31 is patentable over Howden in combination with Pichel or Jochim.

Claims 33 depends from independent claim 31. When the recitations of this claim is considered in combination with the recitations of claim 31, Applicants submit that this claim is likewise patentable over Howden in combination with Pichel or Jochim for at least the same reasons set forth above.

Claim 34, as amended, recites a method of manufacturing a telescoping mirror comprising “releasing the mirror body (25) with the reflective layer (26) from the mandrel (10) without a supporting structure.” As discussed in more detail above, and in combination with the other recitations of claim 34, Howden in combination with Pichel or Jochim fails to describe or suggest a method as recited in claim 34 including releasing a mirror body with a reflective layer from a mandrel without a supporting structure. Accordingly, for at least the

reasons set forth above, Applicants submit that claim 34 is patentable over Howden in combination with Pichel or Jochim.

Claims 36 and 37 depend from independent claim 34. When the recitations of these claims are considered in combination with the recitations of claim 34, Applicants submit that these claims are likewise patentable over Howden in combination with Pichel or Jochim for at least the same reasons set forth above.

For at least the reasons set forth above, Applicants respectfully request that the rejections of claims 1, 3-6, 8-13, 31, 33, 34, 36 and 37 under 35 U.S.C. 103(a) be withdrawn.

Further, as the Federal Circuit has recognized, obviousness is not established merely by combining references having different individual elements of pending claims. Ex parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Inter. 1993). MPEP 2143.01. Rather, there must be some suggestion, outside of Applicants' disclosure, in the prior art to combine such references, and a reasonable expectation of success must be both found in the prior art, and not based on Applicants' disclosure. In re Vaeck, 20 U.S.P.Q.2d 1436 (Fed. Cir. 1991). In the present case, neither a suggestion or motivation to combine the prior art disclosures, nor any reasonable expectation of success has been shown.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. Further, it is impermissible to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art. The present Section 103 rejections are based on a combination of teachings selected from multiple patents in an attempt to arrive at the claimed invention.

Specifically, Howden does not describe or suggest a need for controlling the electroforming process and release process to suppress the building up of internal mechanism tension. In fact, Howden teaches that no such control is necessary. Specifically, Howden teaches that a first series of identical segments are located on the single, rigid support in the

form of a peripheral ring, with each segment of the first series having an identical part profile of the desired reflector profile, and a second series of identical segments each with another part profile of the desired reflector profile located on the rigid support in a second ring of radius innermost to the peripheral ring. Further, the segments form a common reflective surface for the short wave radiations, and wherein, the segments are each mounted in their finished shape on removal from the moulding tool without any further shape modification comprising cutting, edge grinding, surface polishing and/or *thermal or mechanical stress relieving* (column 6, lines 3-16, emphasis added). Further, there is no need to provide such control for the forming of the mirror as the substrates in Howden are fabricated of a material which is of sufficient thickness and which is stress relieved for each segment to be dimensionally stable with regard to thermal changes (column 8, lines 11-15). There is simply no need to control the method of Howden to avoid internal stress.

Thus, there is no teaching or suggestion in the cited art for the combination, and the Section 103 rejection appears to be based on a hindsight reconstruction in which isolated disclosures have been picked and chosen in an attempt to reject the claims of the present invention. In fact, Howden teaches away from the combination. Accordingly, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection of claims 1, 3-6, 8-13, 31, 33, 34, 36 and 37 be withdrawn.

Claims 2, 32 and 35 are rejected under 35 USC § 103(a) as being unpatentable over Howden in view of Pichel or Jochim, and further in view of George et al. (U.S. Patent 4,648,944) or Vaaler (U.S. Patent 4,786,376). Applicants respectfully traverse this rejection.

George et al. and Vaaler describe devices or gauges for measuring and monitoring internal stress during electroforming and/or electroplating processes.

Claim 2, 32 and 35 recites "wherein the internal mechanical tension is measured during the electroforming process using an additional electroforming sample (18) which is electroformed in parallel or an electronic stress measurement device." Applicants submit that even from a cursory review of George et al. or Vaaler, these references fail to make up for the deficiencies of Howden, Pichel or Jochim in failing to teach or suggest a method as recited in claims 1, 31 and 34. Because claims 2, 32 and 35 depend from

independent claims 1, 31 and 34, respectively, when the recitations of these dependent claims are considered in combination with the recitations of claim 1, 31 and 34, Applicants submit that these dependent claims are likewise patentable over the cited references for at least the reasons set forth above.

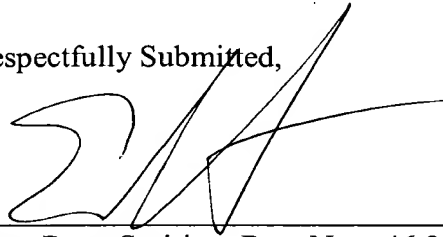
Additionally, although Pichel and Jochim teach that necessary controls are needed to assure a stress-free deposition, these references fail to describe or suggest the need for using an additional sample. In particular, these references state that what is meant by “necessary controls” is already known in the art. Both the George et al. and Vaaler references describe controlling plating induced stress known in the art after Pichel and Jochim. In particular, both of these references were filed after the issue dates of Pichel and Jochim and therefore could not be “necessary controls” already known in the art. Thus, the combination of these references is improper as there cannot be suggestion or motivation to combine when the methods were not known in the art. Accordingly, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection of claims 2, 32 and 35 be withdrawn.

Claim 7 is rejected under 35 USC § 103(a) as being unpatentable over Howden in view of Pichel or Jochim, and further in view of Engelhaupt et al. (U.S. Patent 6,406,611). Applicants respectfully traverse this rejection.

Applicants submit that even from a cursory review of Engelhaupt et al., this reference fails to make up for the deficiencies of the Howden, Pichel or Jochim references in failing to teach or suggest a method as recited in claim 1. Because claim 7 depends from independent claims 1, when the recitations of this dependent claim is considered in combination with the recitations of claim 1, Applicants submit that this dependent claims is likewise patentable over the cited references for at least the reasons set forth above.

In view of the foregoing amendments and remarks, it is respectfully submitted that the prior art fails to teach or suggest the claimed invention and all of the pending claims in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read 'Evan Reno Sotiriou', written over a horizontal line.

Evan Reno Sotiriou, Reg. No.: 46,247
ARMSTRONG TEASDALE LLP
One Metropolitan Square, Suite 2600
St. Louis, Missouri 63102-2740
(314) 621-5070